NURSE REPORT	OCCUPATIONAL HEALTH BRANCH DEPARTMENT OF HEALTH SERVICES STATE OF CALIFORNIA
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NURSE REPORT #2 **ARM AMPUTATED BY TRACTOR POWER-TAKE-OFF CDHS(COHP)-FI-92-005-02**

Summary

A farm laborer was feeding the cows on a dairy farm. He drove a tractor which pulled a feed wagon. Inside the wagon a large metal screw (or auger) turned, mixing the feed and pushing it out. This screw in the wagon was connected by a driveshaft to the *power-take-off* unit at the back of the tractor. The driveshaft spun rapidly between the tractor and the wagon, and was not covered or guarded.

The worker got off his tractor to check the driveshaft, leaving the tractor idling and the shaft still turning. When he reached across the shaft to pull a lever on the tractor, his shirt sleeve was caught by a joint in the shaft. The worker was wrapped around the shaft, his arm was ripped almost completely off, and his neck was fractured. The worker survived, but lost his arm.

How could this injury have been prevented?

-All power take off units and shafts must have guards, shields, and sleeves.

-Check equipment before using it.

-Turn the power off and wait for the machine to stop moving before

fixing it.

-Give workers safety training.

-Do not wear loose fitting clothing around machinery.

CASE 191-012-01 May 22, 1992

The NURSE (Nurses Using Rural Sentinel Events) project is conducted by the California Occupational Health Program of the California Department of Health Services, in conjunction with the National Institute for Occupational Safety and Health. The program's goal is to prevent occupational injuries associated with agriculture. Injuries are reported by hospitals, emergency medical services, clinics, medical examiners, and coroners. Selected cases are followed up by conducting interviews of injured workers, co-workers, employers, and others involved in the incident. An on-site safety investigation is also conducted. These investigations provide detailed information on the worker, the work environment, and the potential risk factors resulting in the injury. Each investigation concludes with specific recommendations designed to prevent injuries, for the use of employers, workers, and others concerned about health and safety in agriculture.

BACKGROUND

In December, 1991 a California Occupational Safety and Health Administration (Cal/OSHA) district compliance office reported to the NURSE project that a dairy farm employee's left arm had been amputated in a work-related injury. The incident occurred while the dairy farm laborer was driving a tractor pulling a cattle feed wagon. Four days after the incident the dairy owner notified Cal/OSHA, who conducted an investigation within a few days. A nurse from the NURSE project interviewed the injured worker in the hospital on January 22, 1992, and a Senior Safety Engineer, epidemiologist, and nurse from the NURSE project conducted an on-site investigation on February 13, 1992. The NURSE staff discussed the incident with the owner of the dairy and took photographs of the feed wagon and other equipment with the employer's consent.

The incident occurred on a dairy that has approximately 500 cows and 20-25 calves. The staff consists of two members of the family that owns the dairy, five full-time employees, and two summertime employees. This is a relatively small dairy in which the farm laborers performed a variety of tasks, including tractor driving. At the time of the incident the dairy had no written injury prevention program, no safety training, and no designated person responsible for safety. Therefore, the owner was not in compliance with Title 8 California Code of Regulations 3203 -- Injury and Illness Prevention Program. (As of July 1, 1991 the State of California requires all employers to have a written seven point injury prevention program: 1. designated safety person responsible for implementing the program; 2. mode for ensuring employee compliance; 3. hazard communication; 4. hazard evaluation through periodic inspections; 5. injury investigation procedures; 6. intervention process for correcting hazards; and 7. a health and safety program.)

INCIDENT

On December 22, 1991 at approximately 8:00 a.m. a 30 year old male Portuguese farm laborer was driving a farm tractor which was pulling a dairy feed wagon. The power take off unit at the rear of the tractor was driving the feed dispensing auger system inside the feed wagon. (A power take off unit (P.T.O.) is an extension of the tractor transmission shaft used to power implements with the tractor engine.) This is a common method of feeding the dairy cows by using the auger to mix the feed and push the cattle feed out. The P.T.O. was apparently not functioning correctly, and the employee left the tractor engine idling and climbed off the tractor to check the attachment. The employee was standing next to the P.T.O. when he turned to reach up and pull the hydraulic lever on the rear of the tractor which engages or disengages the P.T.O. At this time his left shirt sleeve was caught on the rotating shaft

of the P.T.O. The employee was wound around the P.T.O shaft as it rotated. The rotation of the shaft wedged him into the metal frame around the P.T.O. shaft and sheared his arm almost completely off. He also hit his head on the metal frame, receiving a 2 centimeter laceration on his scalp near the back of his head, and a cervical fracture. The tractor engine stalled at this time because it was idling at low speed and jammed by the body of the farm laborer. He lost consciousness for an unknown length of time; when he regained consciousness he called for help and was found by co-workers. Employees at the dairy called the local ambulance service and then disconnected the P.T.O shaft in order to extricate the injured worker's arm. At this time his left arm almost completely detached about half way between his shoulder and elbow, remaining connected only by skin and muscle.

The ambulance crew immobilized his spine, splinted his arm, gave oxygen, started an I.V. and transported him to the emergency department of the local hospital. He was stabilized and transferred four hours later by helicopter to a microsurgery medical center 200 miles from the incident to have his arm reattached. Because of the extensive damage and loss of tissue to his arm, reattachment was not attempted and the arm was surgically amputated approximately six inches below his shoulder. Currently, the employee is in rehabilitation and is planning to return to work at the dairy.

PREVENTION STRATEGIES

1. The shaft and universal joints of the P.T.O. should be guarded by commercially available shields which cover moving parts. This P.T.O. was not shielded at the time of the incident, which is a violation of California law[1] and recognized safety practice, in this case leading directly to the amputation of the worker's arm. At the time of our investigation, the dairy owner had purchased and installed guards on the P.T.O. of the involved tractor. If the P.T.O. shaft had been guarded at the time of the incident, the worker's sleeve would have not been caught and he would not have lost his arm.

2. All equipment should be checked prior to beginning daily work activities. This allows the worker to make sure that all equipment is working correctly, before any work is initiated. A regular check of the tractor and feed wagon prior to its use would have identified the problem of the malfunctioning P.T.O. The worker could then have had this fixed before trying to use it.

3. The design of the tractor permitted the driver to reach behind while still in the seat to pull the lever for the P.T.O. Therefore, he should not have tried to reach the lever from the ground. Because he was standing near to the rotating shaft while he was attempting to adjust the P.T.O. he came into contact with the rotating shaft. If he had remained in the seat this would not have occurred.

4. Workers should disconnect the power source and wait for all machine movement to stop before servicing equipment.[2] If the employee needed to leave the tractor, he should have turned the tractor engine off prior to leaving the tractor seat. He would not have come into contact with the rotating P.T.O. shaft if he had complied with this regulation.

5. This worker had only been working at this dairy for 3 months although he had worked at different dairies for approximately 10 years. Since he had begun working at this dairy, he had received no safety training related to equipment or job tasks or hazard identification.[3] If he was trained on how to recognize and avoid hazards he might not have lost his arm.

6. This incident occurred because loose clothing worn by the worker was caught in the rotating P.T.O. shaft. If the worker had better fitting clothing this incident would not have occurred.[4] The owner of the dairy was wearing a loose shirt at the time of this investigation, which indicates that

he still did not recognize this as a hazard. This is an inexpensive and relatively simple way of preventing machinery entanglement.

1. California Code of Regulations T8 3440 (subparagraph c) requires that all P.T.O. units and drivelines be guarded.
2. California Code of Regulations T8 3441 Paragraph a (subsection c) requires that power sources be disconnected and machine movement stopped before servicing equipment.
3. California Code of Regulations T8 3383 (subparagraph b) requires workers to receive safe operating and servicing instructions at the time of their initial assignment.
4. California Code of Regulations T8 3383 (subparagraph b) requires that loose clothing that could be entangled in machinery should not be worn